DOCUMENT RESUME

ED 212 818 CE 031 260

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TITLE Adult Learning: A Personal Construct Approach.
PUB DATE Aug 81
NOTE 56p.; Paper presented at the International Congress on Personal Construct Psychology (4th, Ontario, Canada, August 24-28, 1981).

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Adult Education; *Adult Learning; *Cognitive Processes; Educational Environment; Educational Planning; Educational Research; Foreign Countries; Individual Development; Learning; *Learning Modalities; *Learning Processes; Pilot Projects; Postsecondary Education

ABSTRACT

A pilot study into adult learners' perceptions of adult learning was undertaken in early 1980 at Adelaide College of the Arts and Education (Australia). The research set out to explore whether there are underlying dimensions which adult learners use in evaluating and comparing learning experiences. Five volunteer subjects completed Kolb's Learning Style Inventory and a Kelly Repertory Grid with both elements and constructs being elicited. The grids were subjected to Slater's INGRID program and to Shaw's FOCUS program. It was found that while there are some shared constructs about adult learning, there are also many unique and idiosyncratic dimensions. It is argued that some sort of exploratory dialogue both about the teaching/learning situation itself, and about the subject being studied, may be an appropriate starting point when working with a group of adult learners. (Author/KC)

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ADULT LEARNING :

A PERSONAL CONSTRUCT APPROACH

PAPER PRESENTED AT THE
FOURTH INTERNATIONAL CONGRESS ON
PERSONAL CONSTRUCT PSYCHOLOGY
BROCK UNIVERSITY
ST. CATHARINE"S
ONTARIO

24-28 August 1981

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SYNOPSIS

This paper briefly reviews a pilot enquiry into adult learners' perceptions of adult learning, which was undertaken during the First Term of 1980.

The research set out to explore whether there are underlying dimensions which adult learners use in evaluating and comparing learning experiences. Five volunteer subjects completed Kolb's Learning Style Inventory (Kolb 1976) and a Kelly Repertory Grid (Kelly 1955) with both elements and constructs being elicited. The grids were subjected to Slater's INGRID programme and to Shaw's FOCUS programme, and the results are analysed and discussed in this paper.

It was found that whilst there are some shared constructs about adult learning, there are also many unique and idiosyncratic dimensions. It is argued that some sort of exploratory dialogue both about the teaching/learning situation itself, and about the subject being studied, may be an appropriate starting point when working with a group of adult learners.

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INTRODUCTION

One recurring theme in the literature of adult education is the need to "start where the learner is". This is not, in itself, a new concept, research into expectations, readiness, and individual information processing has for years provided a sound psychological basis for this common-sense piece of advice. The problem has always been how to find out "where the learner is".

Over the years, many techniques have been tried, with the intention of providing necessary linking of new knowledge into existing structures. Questions, advance organisers, introductory overviews, preliminary discussions, questionnaires and many other devices have been employed by teachers attempting to provide essential continuity of new learning.

Recently there has been increased attention to "the perspective of the personal", to the relativity of knowledge, in short to the fundamental importance of individual perspectives and idiosyncratic structures of meaning.

This paper describes a pilot research project, carried out during Term 1 of 1980 at Adelaide College of the Arts and Education, and based on the work of the late Professor G.A. Kelly, in his two volume Psychology of Personal Constructs. It is no more than a preliminary investigation into the appropriateness of Kelly's Theory of Personal Constructs (and in particular his Repertory Grid Technique) as one way of exploring individual structures of meaning and ways of construing.

PILOT STUDY

The pilot research study reported here grew out of the author's experiences with two different groups of adult learners, in rapid succession. In one case, a group of adult educators was undergoing an intensive introductory course in teaching methodology. They had been introduced to the notion of contract learning, and many of them were experiencing extreme difficulty and apparent frustration in dealing with the concept. A few weeks later, the author was involved with another group of adult educators, this time undertaking an undergraduate teaching qualification at a College of Advanced Education. In this situation,

highly specific, competency-based instructional materials were being used and again, some of the learners were clearly quite uncomfortable with, and indeed antagonistic towards, the teaching approach.

The juxtaposition of these two experiences - in one case a group of learners feeling unhappy about an andragogical humanistic and open-ended approach and in the other with its philosophical and methodological opposite - brought sharply into focus the futility of searching for one right method to teach. Patricia Cross in her book Accent on Learning writes :

> It now seems clear that we are not going to improve instruction by finding the method or methods that are good for all people. The research on teaching effectiveness has been inconclusive and disappointing because, I suspect, we were asking the wrong questions. When we ask whether discussion is better than lecture, whether television is as good as a live teacher, whether programmed instruction is an improvement over the more traditional methods, we find that for that mythical statistical average student it seems to make little difference how we teach. But when we look at the data student by student, it is clear that some students improve, some remain unaffected, and a few actually regress under various teaching conditions. The very process of averaging the pluses, the minuses, and the non-changers wipes out the message that different methods work for different students.
>
> (Cross, 1976 pp111-2)

Putting this insight together with the point already made about starting where the learner is, it suddenly seemed likely that the acceptability or otherwise of any particular teaching strategy is part of the pre-existing framework which the adult educator needs to take into account.

Research into the acceptability or otherwise of certain teaching strategies, is plagued by several problems. The first one is the possibility that, although in common usage, the learner may not have heard of, or experienced, a particular teaching approach. To ask such a person to comment on the acceptability of, for instance, role plays or encounter groups, is to invite meaningless results. This is especially true if respondents are asked to make some sort of comparison or ranking of various alternatives.

A second problem is the intrinsic variability of teaching methods, and consequently of our understanding of them. There are two corollaries of this. The first one relates to the precision of each person's understanding of the method, and the second to the sort of feelings or attitudes which each person might have towards the various methods. Whilst we might all understand roughly the same thing by the word 'lecture', there is probably more potential for differences when we use lesson, demonstration, laboratory session, discussion, seminar and so on. Meanings attached to each word are more variable and less precise. Secondly, even if there is agreement as to the identifying characteristics of a particular method, we probably have in mind different *examples*, and hence are likely to have different attitudes, not only to the *concept* of the method, but to the specific examples of which we are aware.

There are thus problems inherent in any research approach which relies on people responding to generic terms for teaching/learning situations.

This pilot research set out to establish, for individual respondents, situations in which they learned, and then to explore what they saw as the underlying criteria (or constructs) along which these learning experiences could be arranged and compared. It was decided to use Kelly's Repertory Grid Technique as a method for eliciting these views of learning as, unlike many other techniques, it is completely 'content free', relying entirely on verbal labels and construct dimensions supplied by the respondents. Although some interesting findings did emerge, which may have wider applicability in the general area of adult education, this research was essentially idiographic and aimed only at exploring individual approaches to adult learning.

The respondents were volunteer subjects, undertaking a postgraduate award in Further Education. All were studying the subject Psychology of Adult Learning, and they were invited to participate at the first lecture in the academic year. In addition to receiving copies of this report, each respondent was given a copy of his/her learning style profile and had the opportunity to discuss the meaning of their grids either at the interview or at some later time.

Each respondent was interviewed separately, the interview lasting for about 1½ hours. As a prelude, people were asked to complete Kolb's Learning Style Inventory - these were scored during a later part of the interview, and the participants were given a copy of their individual learning profile before leaving.

The actual investigation proceeded as follows:

The respondent was asked to think of situations in which they had learned something - these were recorded verbatim by the interviewer. Responses covered the whole range from formal structured learning situations through non formal and self directed to incidental and unanticipated learning. When the respondent had identified a number of significant learning episodes (which interestingly was twelve in every case), brief descriptions were transferred onto previously prepared slips of paper, each one of which was numbered in one corner. The complete list of these learning situations appears as Appendix 1.

The triadic elicitation technique was used as a way of discovering what underlying constructs each respondent had in mind, when discriminating learning events. Three of the previously elicited learning situations were presented together, and the respondent asked to say in what way two of them were alike, and thereby different from the third. The similarity becomes one end of a continuum or construct, with the difference or contrast being the verbal label applied to the other end. Once a construct had been elicited in this way, respondents were asked to rate all the learning situations using the construct as a scale, or mode of discrimination. In this research, respondents were asked to use a scale ranging from -3 to +3, the scores were later converted to a standardised scale of 1-7. The constructs elicited in this way appear in Appendix 2.

This procedure yields a grid which has the learning experiences (elements) along the top and the underlying dimensions (constructs) down the side. Since every element is rated on every construct, there is a matrix of figures which

> can be subjected to many of the kinds of group statistics which we have hitherto reserved for populations of subjects. Cluster analysis methods, t-tests of group differences, correlational consistency measures, significance concordance, and a range of other measures are technically feasible. They are potentially rich in the light they may throw on the underlying structure and manifest content of the construing which underlies the person's grid responses.
>
> (Fransella and Bannister 1977 p.9)

The grids thus elicited were subjected to two computer analyses, using programmes which have been especially written to handle repertory grid data. The first, called INGRID and written by Patrick Slater, is a principal component analysis, which identifies the two principal components implicit in the data, and plots out all the constructs and all the elements on these two axes, which are orthogonal. The second, a programme called FOCUS and written by Laurie Thomas and Mildred Shaw, is a two way cluster analysis which reorganises the columns and rows so that they are adjacent to columns and rows to which they are most similar. It computes an index of similarity, and prints out dendrograms or tree diagrams, showing the percentage degree of match between adjacent clusters. This latter package has been described by Shaw as "a method devised mainly for use in feeding back the analysis of the grid to the subject without displaying any mathematical "magic", (or) complex computer printout." (Shaw 1978 p62). She writes elsewhere

> The purpose of the feedback is to offer to the elicitee a pattern of the groupings of the elements on the constructs, and the constructs on the elements. The ensuing conversation is an exploration of the personal meaning attached to these groupings by the elicitee. The validity of the analysis is measured only in terms of the subjective feeling of personal significance assessed by the occurrence or otherwise of what has been called the 'aha' experience, or 'the creative flash.'
>
> (Shaw 1980 p33)

RESULTS

Because of the idiographic nature of the data, it is perhaps dangerous to attempt to draw any firm general conclusions about adult learners. Despite this warning, I will hazard a few speculative comments about the general outcomes from this pilot research, later. Initially, however, I will examine each of the five respondents in turn. To preserve confidentiality, the names of the respondents have been changed.

Bruce

In completing Kolb's Learning Inventory, Bruce (who works as a Training Officer in a technical field) was found to be an accommodator - ie. high on active experimentation and on concrete experience. His learning situations were predominantly practical, though he also reported learning from verbal and visual media.

It seems that Bruce's constructs about learning are not tightly clustered together. The ideas of *involvement*, and *obtaining feedback* are related to each other (being clustered at the 72% level), and the continuum *information interchange - one way information* is related to *original thinking - someone else's ideas* (67%). Whilst other constructs such as *solitary - group*, or *personal satisfaction - satisfy someone else*, do have a place in Bruce's view of teaching and learning, they are not closely related to the other constructs.

Looking at the clustering of learning situations, several significant clusters seem to emerge. The first one, at 98% level of match, includes the elements discussion with others/arguing with others. The interesting point here is not only the 'with others' part, but the fact that Bruce (who supplied both these words 'discussing' and 'arguing' himself) apparently sees their potential for learning as being closely related. At the 94% level of match are two learning experiences - one involved pulling apart a carburettor, using a manual as a guide, where the other was some sort of input, followed by a manual. For Bruce, the written word is an adjunct to other learning stimuli. Showing another aspect of his learning strategies, note taking and re-reading notes represents a pair of activities, closely related in Bruce's experience. Looking at the broad picture, Bruce's learning situations seem to cluster into three main groups - something to do with notes, something to do with hands-on experience, and something to do with learning from others. Interestingly,

the element 'By watching others' is the last element to join a cluster - what one would expect of someone with under developed skills of reflective observation.

When we look at the principal components analysis, it seems that the main dimension for Bruce has something to do with *creating personal meaning* and matching it with others' ideas. Whilst the second dimension identifies something to do with the *amount of effort* required. For Bruce, *formal study* and *no feedback* are closely linked, and are also close to the ideas of *non-involvement*, *learning to satisfy someone else*, and a *more disciplined learning structure*.

Heather

At the time of completing the grid, Heather was a full-time student, preparing to become a Secondary Teacher. Her learning style profile was extremely well balanced, showing a person who seems to learn from a variety of experiences and resources.

In the process of eliciting a grid, she was able to identify only three constructs - no matter how many sets of three words were presented, she always saw them as conforming to one or other of the three dimensions initially elicited. Several reasons for this state of affairs suggest themselves. For a start, she might simply have a very unelaborated construct system in terms of teaching and learning. Secondly, the three constructs elicited may be higher order constructs, where Heather felt unable or unwilling to identify the lower order or subordinate constructs of which they are comprised. Another possibility is that, because Heather comes from an ethnic background, she did not have "adequate" labels for the subordinate constructs. Then again, it may be an example of poor elicitation technique, as the author was unfamiliar with the process at the time. The three constructs were *with others - alone*, *intellectual - experience*, and *passive - active*; they are not highly related to one another.

In turning to Heather's learning strategies (elements), here too, it appears that there was comparatively little clustering, indicating possibly that learning strategies are seen is relatively independent (this certainly matches her learning style profile). Learning by practice, by taking a risk, by trial and error and by going outside the guidelines for reading were seen as reasonably closely related (83%) and another cluster was formed by the elements Consulting more experienced

people and integrating others' ideas. The element 'reading' was not closely related to other elements in Heather's grid.

On the principal components analysis, Heather's first principal component has something to do with learning alone and independently versus learning with, and through others. The second principal component identifies an active and enquiring approach, versus a passive and receptive one.

Terry

Terry works in a senior clerical position for a Government Department. In addition to his responsibility for the development of staff working for him, he lectures part-time in a College of Further Education, at night. His learning style profile showed him to be predominantly an active experimenter, with some strengths as a reflective observer.

Terry's constructs about learning are not, on the whole, highly clustered. The most closely related constructs were those of *active involvement - passive observation* with *practical experience - theoretical*. The other pair was *making a move - collecting for later*, and *having an experience - getting information*. Interestingly, these four constructs, which form something of a cluster at the 67% level, are all to do with *gathering data*, versus *checking it out with others*, which emerges as Terry's first principal component on the Principal Component analysis.

The construct which is least related to all the others is *seeking confirmation - coming to grips with problem alone*, which perhaps suggests some slight unwillingness or hesitation to confer with others before Terry has the 'answer' for himself. Some small confirmation of this is implied by the fact that soliciting feedback from others is the mode of learning least related to all the other modes of learning cited by Terry.

Amongst the learning situations which Terry suggested, emulating a model and trying to succeed first time were highly related (implying that where need to succeed is high, Terry's most likely strategy would be to copy someone who is already successful). Also highly related were the three ideas of gathering information widely (in interview, Terry mentioned that he is a compulsive applicant for free literature), listening to lecturer and taking notes - all these things are consistent with Terry's strengths as a reflective observer. At the 79% level, the two approaches read first, then apply, and observe my effect on others, are joined, probably reflecting some sort of conceptual similarity in terms of their emphasis on 'data gathering'. When we look at the principal components analysis, they are clearly different from each other on the second of Terry's principal components, which seems to relate to *aloneness* versus *learning with or from others*.

Tom

At the time of the interview, Tom was taking on increasing responsibilities in a training and staff development role in a large public institution. His learning style profile, like Heather's, was remarkably symmetrical and well balanced and in the interview he emerged as a thoughtful, articulate and versatile adult learner, with an obviously highly developed personal philosophy about adult learning.

The clustering of his constructs is quite interesting, with a tight cluster bearing on *learning from others* and *by verbal means*, linked to another pair of constructs *using other people - using self*, and *other people's knowledge and experience - own knowledge and experience*. The other main cluster includes the constructs *mental - physical*, *theoretical-practical*, and *conservative ('safe') - threatening ('risky')*.

This is an interesting example of where, given that one construct is employed (say, *theoretical - practical*) another one (such as *conservative - threatening*) is probably implied, at least a proportion of the time. Tom introduced the construct *open learning situation - rigid/autocratic learning situation*, which would seem to be an important way of discriminating learning situations, yet is not highly correlated with any of the other constructs. Its importance to him is indicated in his principal components analysis.

Tom's learning situations, as would be expected from someone with such a well-balanced learning profile, cover a range from self disclosure to taking things apart, and from reading to observing my effect on others. For Tom, taking things apart and trial and error were synonymous, at least in this context, and checking my understanding with others was very similar to questioning for clarification (98%). The element self disclosure, did not cluster highly with any of the other learning situations cited by Tom.

In looking at the principal components analysis on his grid, the construct *non verbal - verbal* very nearly coincides with his first principal component, whilst the distinction between *safe* and *risky* is almost aligned to the second principal component. It is interesting that Tom placed the element 'self disclosure' at the mid point of the *safe - risky* continuum, where many adult learners would construe it as definintely risky or threatening.

Margaret

Trained as a nurse educator, Margaret was working at the time of the grid elicitation, as a voluntary literacy tutor. Her scores on Kolb's Learning Style inventory showed her to be considerably more active/ experimental and more abstract than the average for trained nurses (see Kolb, 1976a p 32) but she was at least in the same quadrant as Kolb's data, and averages are, after all, made up of a wide range of individual

responses and scores. It is interesting to ponder, however, whether the experience of returning to study might have influenced Margaret's learning style to be more convergent than it might otherwise be?

It appears that Margaret's constructs about learning are not highly clustered, although the pair of constructs *using others - on my own* and *verbal - written* are joined at the 78% level. There is more obvious clustering amongst the elements where reading and note-taking are linked at the 97% level and checking references forms part of the same group. Interestingly, Margaret apparently sees some similarity between obtaining feedback, seeking expert advice and teaching others - in each case presumably some sort of interaction with others is implied.

When the same data is subjected to a principal components analysis, it is seen that the first dimension accounts for 60% of the variance in Margaret's construing, with the second dimension contributing a further 22% - in other words, two components together account for over 80% of the variance in Margaret's construing of learning situations. The first dimension is heavily influenced by the constructs *more formal - less formal*, and *on my own - using others*, while the second dimension apparently has something to do with *theoretical learning* being related to *others' experiences*, whilst *practical learning* is based on *personal experience*.

DISCUSSION

In his seminal work on convergent and divergent cognitive styles, Liam Hudson writes:

> There is, after all, little merit (and no point) in proposing general ideas about human beings if these are largely or completely mistaken. Nor is there any virtue in claiming that an idea is 'basically right', although obscured by the welter of people's individuality. It is the welter that we must observe and measure...
>
> (Hudson, 1967, p 17)

Increasingly, the inappropriateness of classification schemes which seek to submerge the 'welter of individual differences' has become apparent. This is especially true when dealing with adults where recent research work (see, for example, Knox, 1977) shows that individual differences increase, rather than diminish with age. A recent review of the literature (see Appendix 6) revealed no fewer than thirteen major dimensions which have been suggested as significant determinants of learning style - however, very little research has been directed at exploring how learners, themselves, classify and categorise learning experiences.

The research reported here set out

> to discover if there are any commonly shared dimensions along which adult learners usually perceive or define learning situations and experiences.

Despite the small sample size, respondents were found to use as many as twelve different dimensions with which to discriminate amongst learning situations.

Not unexpectedly, dimensions such as 'active-passive', 'practical-theoretical', and 'alone-with others' were mentioned by all respondents and these may reasonably be taken as 'public' ways of discriminating between various learning situations. The beauty of the research methodology used here is that we are privileged to catch a glimpse

of some aspects of the learner's private and individual view of the world. We find, for instance, that Bruce applies the distinction 'disciplined-relaxed' to methods of learning, and that he also classifies them according to the extent to which they 'satisfy someone else' or are for 'personal satisfaction'. Terry thinks of situations in terms of 'collecting for later' or 'making a move' - a perhaps unexpected time dimension applied to learning. Tom, as I have already mentioned, rates learning situations as to whether they are 'safe' or 'risky' - here certainly is room for further exploration between a teacher and his/her students. And what precisely does Margaret mean when she applies the label 'less formal' or 'more formal' to a learning mode? Is it the same as Tom's 'open-rigid learning situation'?

It seems to me that some sort of exploratory discussion along these lines would be a most useful and appropriate starting point with any group of adult learners.

Perhaps even more interesting are the otherwise tacit links between various parts of people's construct systems. Does a 'group situation' *always* imply 'airy-fairy/philosophical learning'? Is 'more formal learning' invariably 'passive', and must 'intellectual' learning always be 'passive'? Is 'formal study' always characterised by a 'lack of feedback'? My immediate reaction to some of these questions is to say 'no', of course not. Experiential and participative techniques can make intellectual learning active, formal study (whatever that means) can, and in fact should, include plenty of feedback, group learning situations can be very pragmatic.

The point is that these learners already have such linkages in their minds. If they encounter one dimension, it automatically *implies* another - for the whole essence of Kelly's Theory of Personal Constructs is that we use our construct systems to 'anticipate the replication of events'. In other words, if past experience has shown that certain things usually go together, then when we encounter one of the characteristics, we anticipate the other. Indeed, we even go further, we *look for* the other one, to corroborate our expectations.

CONCLUSION

As adult educators, we seek to understand the complexity of the adult learner by categorizing and classifying people. In this paper, I have attempted to show that adult learners themeslves indulge in much the same sort of 'scientific' enterprise, and that they have highly complex and elaborate systems of constructs for making sense, not only of learning situations, but indeed of life itself.

Some of these dimensions are more or less clearly understood, and publicly shared (such as the distinction between *alone* and *with others*) but there are many constructs which individuals use, whose meaning is really only known to them and which only have meaning in the context of their total world view.

It seems to me that if we seek to intervene in the processes whereby adult learners make sense of their experiences, then we have a clear duty to recognise the integrity of their construct systems, and to attempt to enter, however inadequately, into their individual universes. And this responsibility extends beyond their views of teaching and learning to the subject matter which is to be taught and learned.

The mapping systems used in this paper are clumsy and imperfect representations of the dynamic and complex way in which people make sense of their worlds, however, in the absence of anything better, they do provide some sort of synoptic starting point for the mutual exploration of *'personally constructed realities'*.

APPENDIX 1

COMPOSITE LIST OF LEARNING SITUATIONS (ELEMENTS) GENERATED BY FIVE ADULT STUDENTS

As an integral part of the research design, each respondent was asked to recall situations in which they had learned something - the situations cover a variety of learning experiences, both formal and informal.

It is interesting to note that these learning situations can be broadly classified using Kolb's dimensions of active/passive, and abstract (theoretical)/concrete (practical). This division, however, ignores a third important dimension, namely the distinction between group learning and learning alone.

The list which follows has been edited by grouping similar learning strategies together, and by the elimination of duplicates (which are signified by an asterisk*). Each individual's list was used as a basis for further exploring his/her constructs about adult learning.

By taking things apart

By practice

By practical experience - book as a guide

By practising skills

By experience

By reflecting on experiences

By relating learning to specific examples

By listening to lecturer

By input followed by a manual

By taking notes **

By re-reading own notes

By charting summarised main themes

By gathering information widely

By reading relevant material

By checking all references for myself

By creative research - resources not known to others

By reading first - then applying **

By trying to succeed first time

By trying out new ideas

By trial and error ***

By taking a risk

By experiencing difficult situations

By failing something I thought I knew

By emulating a model

By explaining to someone else

By teaching others

By sharing information with others

By arguing with others

By talking to others

By involving myself in discussions *

By observing my effect on others *

By observing others **

By observing - then contributing *

By consulting more experienced people (experts) ***

By awareness of others' mistakes

By integrating others' ideas

By self disclosure

By obtaining feedback from others ***

By finding out what is required

By asking specific questions

By checking my understanding with others *

APPENDIX 2

INDIVIDUAL LISTS OF DIMENSIONS *(CONSTRUCTS)* CONCERNING ADULT LEARNING, ELICITED FROM RESPONDENTS

Following the work of Kelly (1955) and of Harri-Augstein (1978), Thomas and Harri-Augstein (1977), Shaw and Thomas (1978), Kevill and Shaw (1980), Pope and Shaw (1979), Pope (1978), Hopwood and Keen (1978) and others, the elements listed in Appendix 1 (which themselves had been elicited from the respondents) were used to explore conversationally, with each respondent, the dimensions which underlie their construing of learning situations. Individual respondents produced as many as twelve, and as few as three, of these bipolar dimensions (or *constructs*).

Verbal labels like these are notoriously unreliable - the same words may be used by different respondents to refer to different underlying discrimations, or alternatively, the same underlying distinction may be described using different words. For this reason, no attempt has been made to edit these constructs - they are reproduced here just as they were generated by the participants.

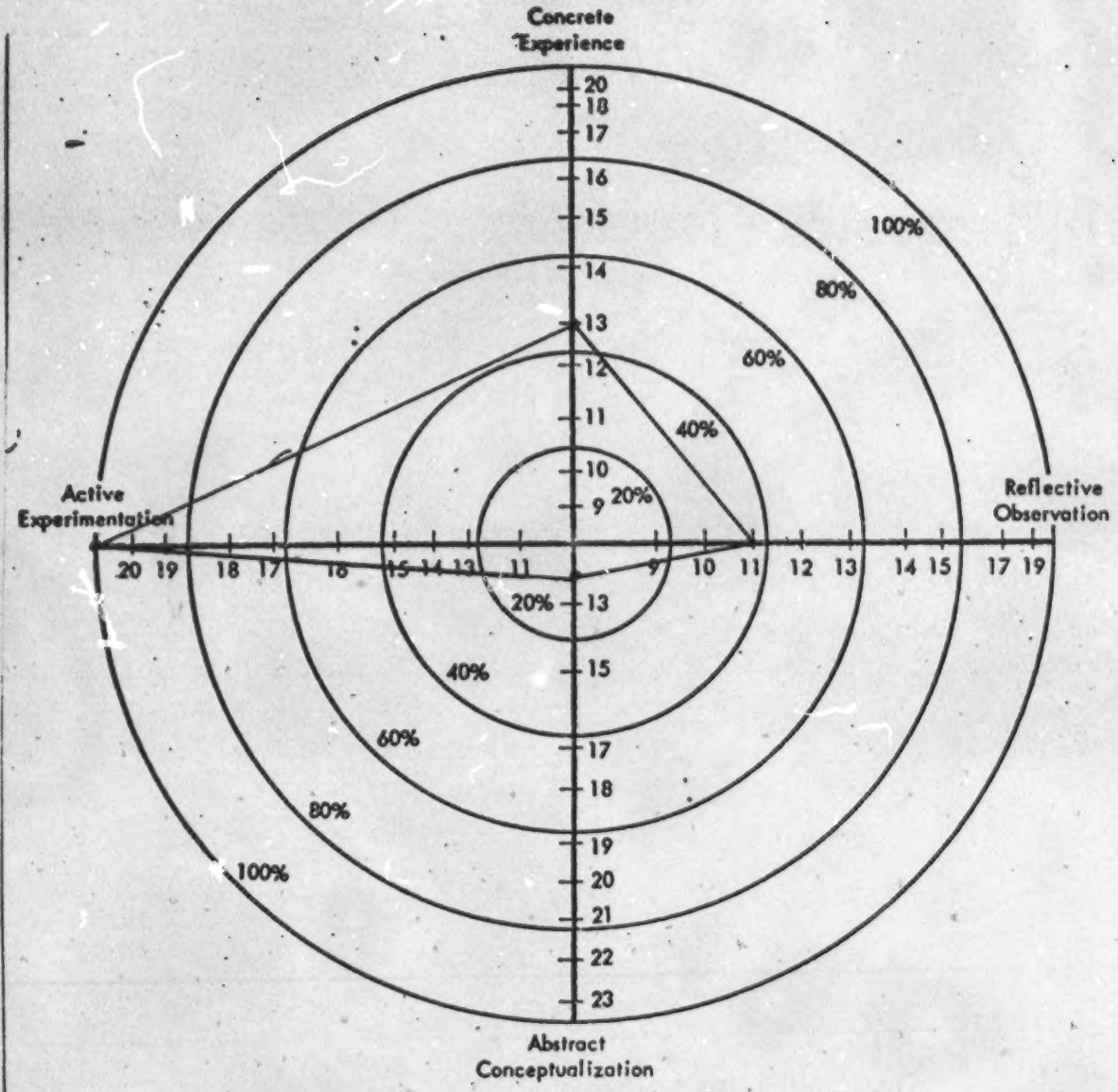
CONSTRUCT (Emergent pole)	CONTRAST (Submerged Pole)
BRUCE	
Basic theory first	Hands-on experience first
Several people	Only one other point of view
Information interchange	One way information
Deliberate effort	No effort
Involvement	Observation/non-involvement
Practical result	Airy-fairy/philosophical
Disciplined	Relaxed
Experimentation	Formal study
Solitary	Group
Original thinking	Someone else's ideas
Feedback	No feedback
Satisfy someone else	Personal satisfaction
HEATHER	
Active	Passive
With others	Alone
Intellectual	Experience
TERRY	
Personal study/work	Interaction with others
Collecting for later	Making a move
Two way (feedback)	One way/own interpretation
Getting information	Having an experience
Practical experience	Theoretical
Gathering data	Confirming learning
Active involvement	Passive observation
Tackling problem on my own	Seeking confirmation

CONSTRUCT (Emergent pole)	CONTRAST (Submerged pole)
TOM	
Practical	*Theoretical*
Interaction with others	*Learning alone*
Two way (feedback)	*One way*
Using self	*Using other people*
Physical	*Mental*
Conservative "safe"	*Threatening "risky"*
Help from others	*Help from self*
Verbal	*Non verbal*
Own experience/knowledge	*Other people's experience/knowledge*
Open learning situation	*Rigid learning situation*
MARGARET	
Practical	*Theoretical*
Verbal	*Written*
Active	*Passive*
Using others	*On my own*
Others' experience	*My experience*
More formal	*Less formal*

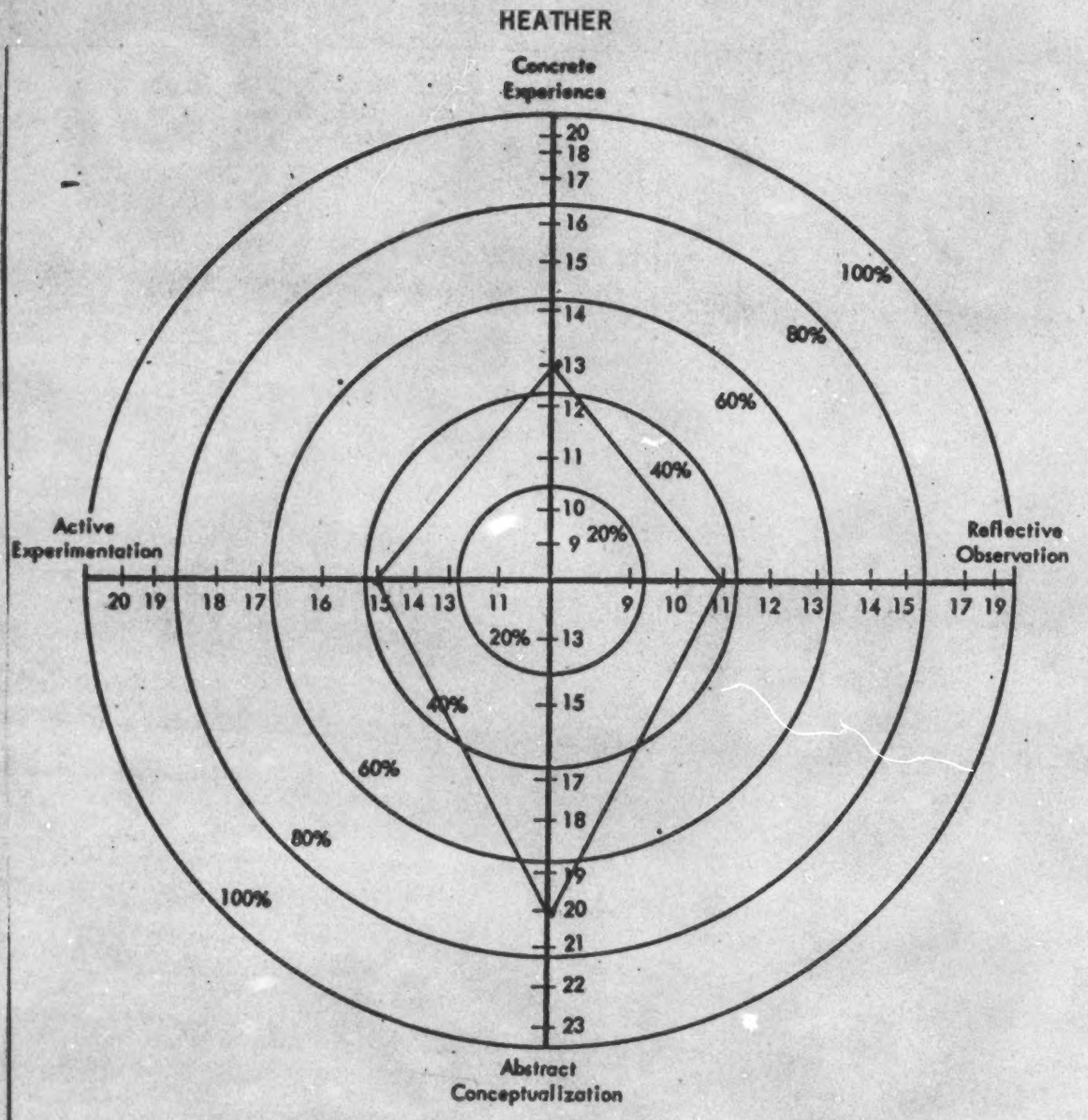
APPENDIX 3

Learning Style Profiles for each respondent, based on completion of Kolb's Learning Style Inventory.

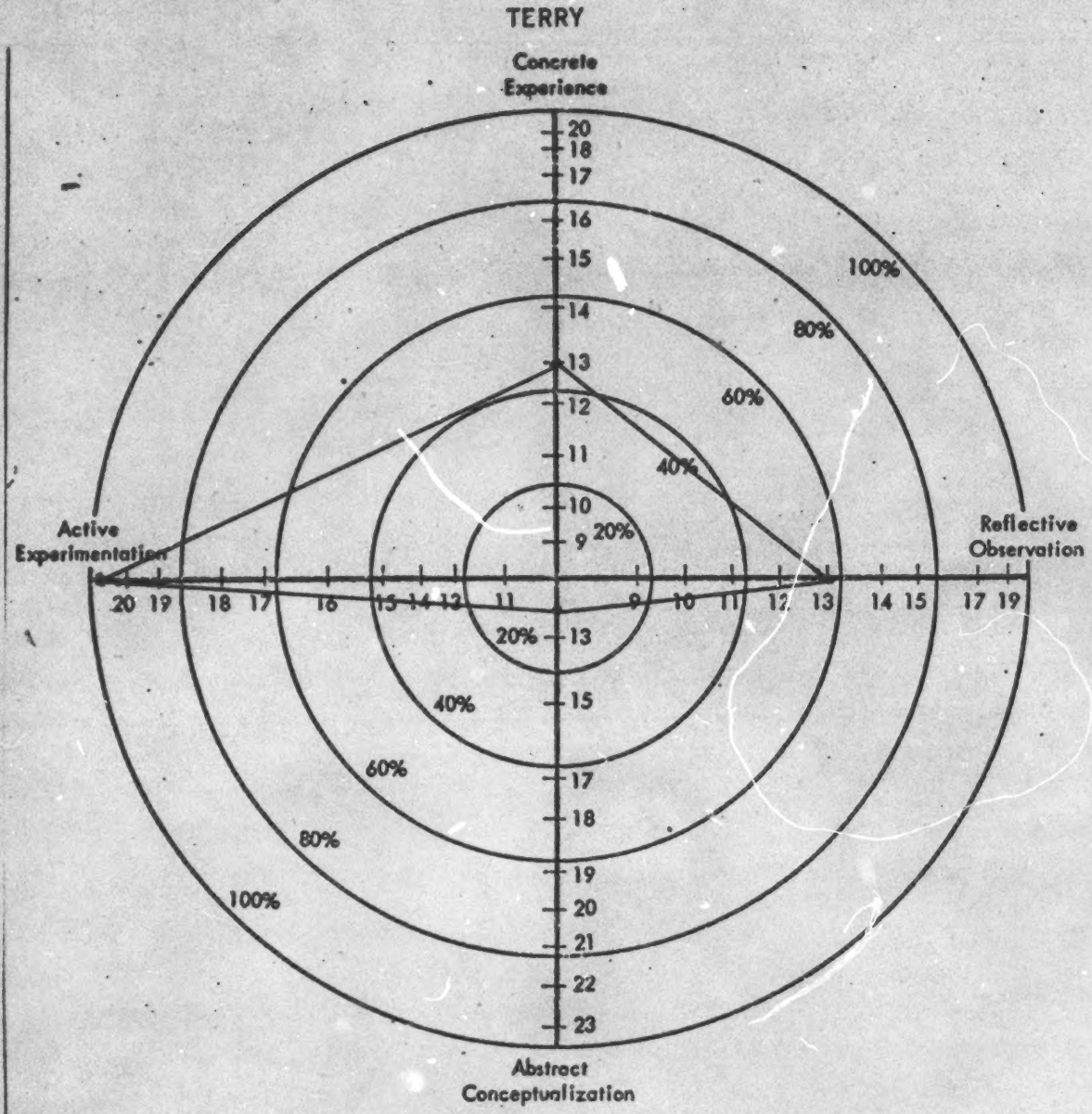
BRUCE



LEARNING-STYLE PROFILE

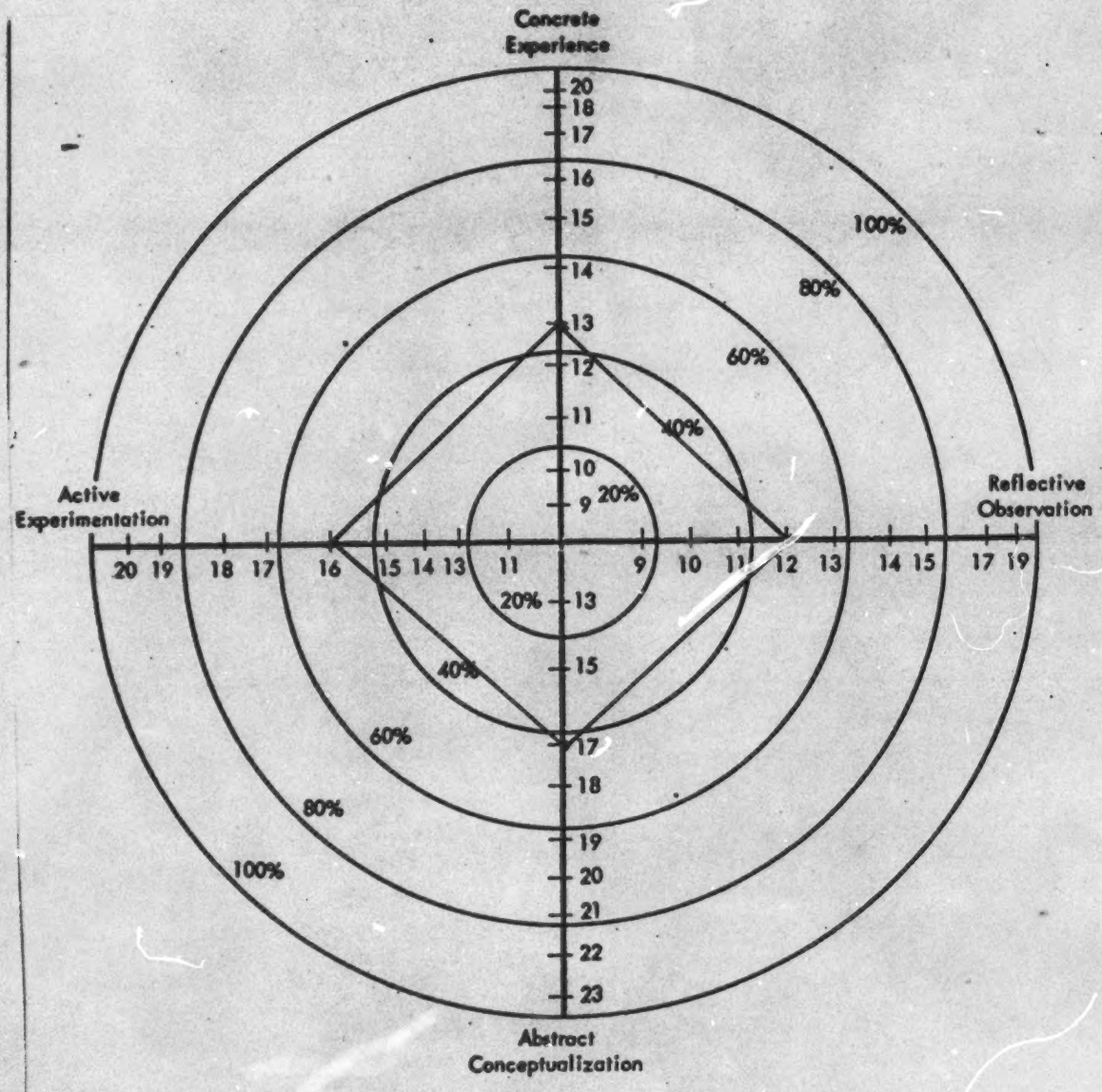


LEARNING-STYLE PROFILE

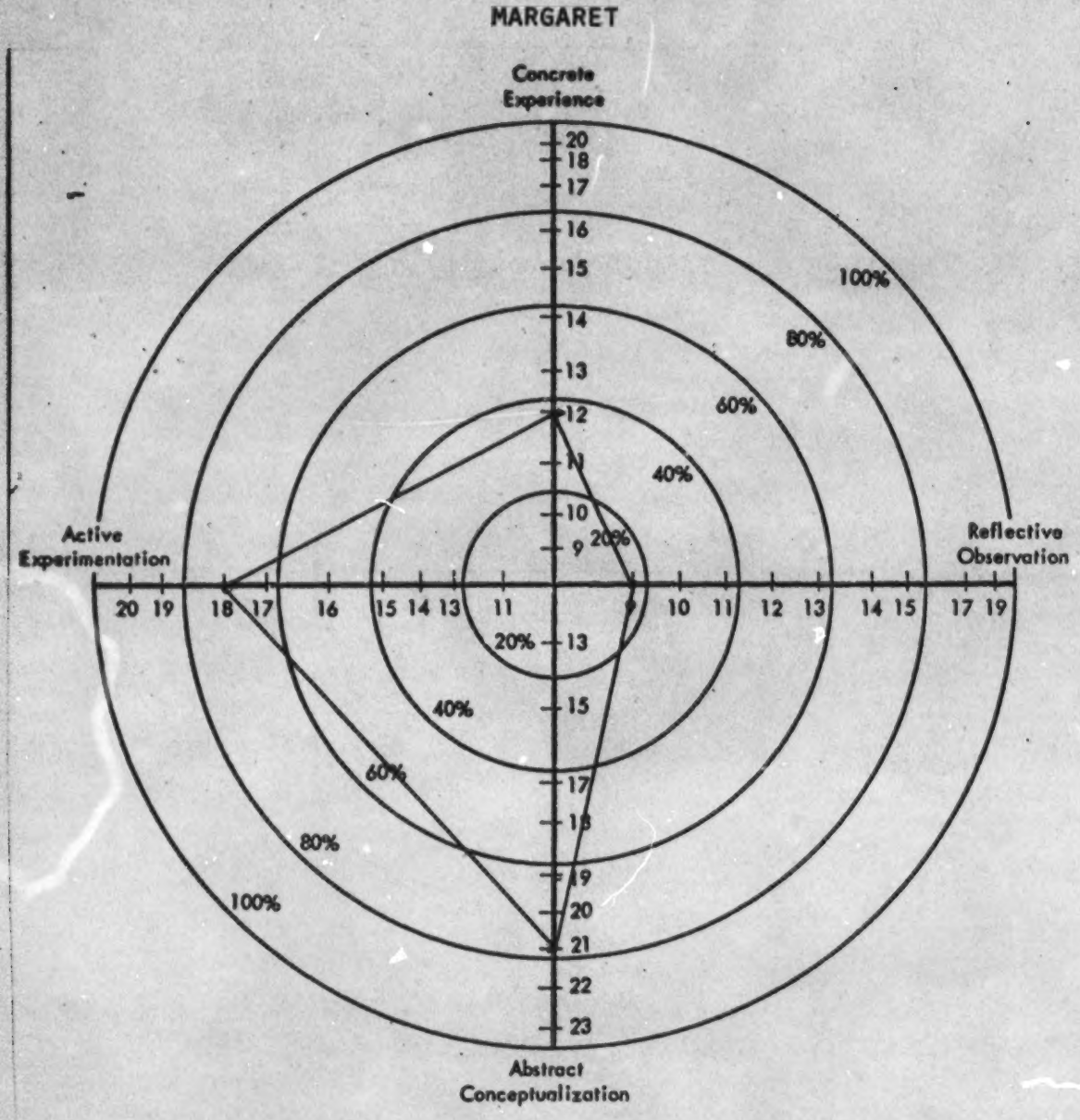

TERRY
Concrete Experience
Active Experimentation
Reflective Observation
Abstract Conceptualization
20 18 17 16 15 14 13 12 11 10 9
20% 40% 60% 80% 100%
20 19 18 17 16 15 14 13 11 9 10 11 12 13 14 15 17 19
13 15 17 18 19 20 21 22 23

LEARNING-STYLE PROFILE

TOM



LEARNING-STYLE PROFILE

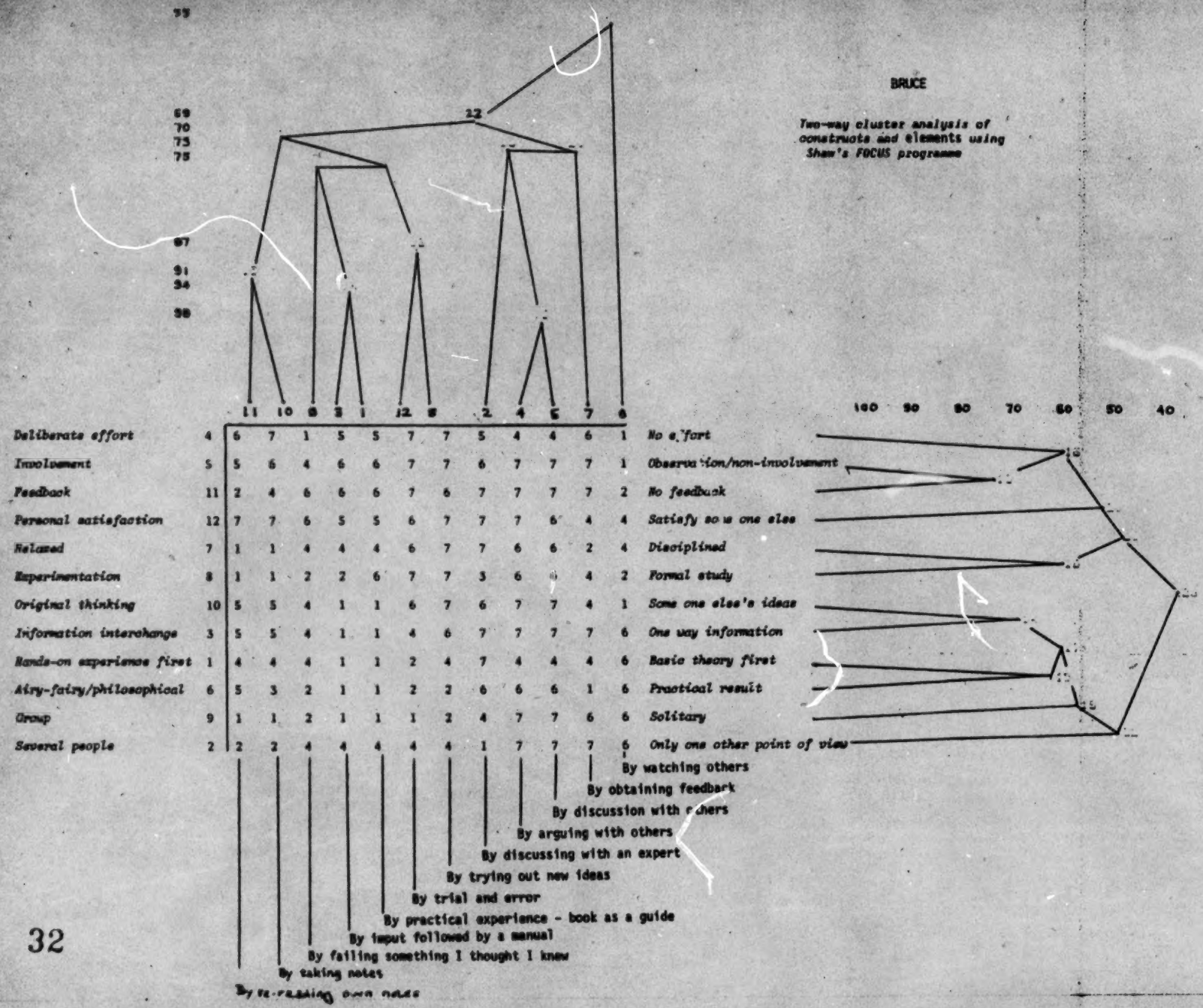

MARGARET
Concrete Experience
Active Experimentation
Reflective Observation
Abstract Conceptualization
100%
80%
60%
40%
20%
20 19 18 17 16 15 14 13 11 9 10 11 12 13 14 15 17 19
20 18 17 16 15 14 13 12 11 10 9 13 15 17 18 19 20 21 22 23

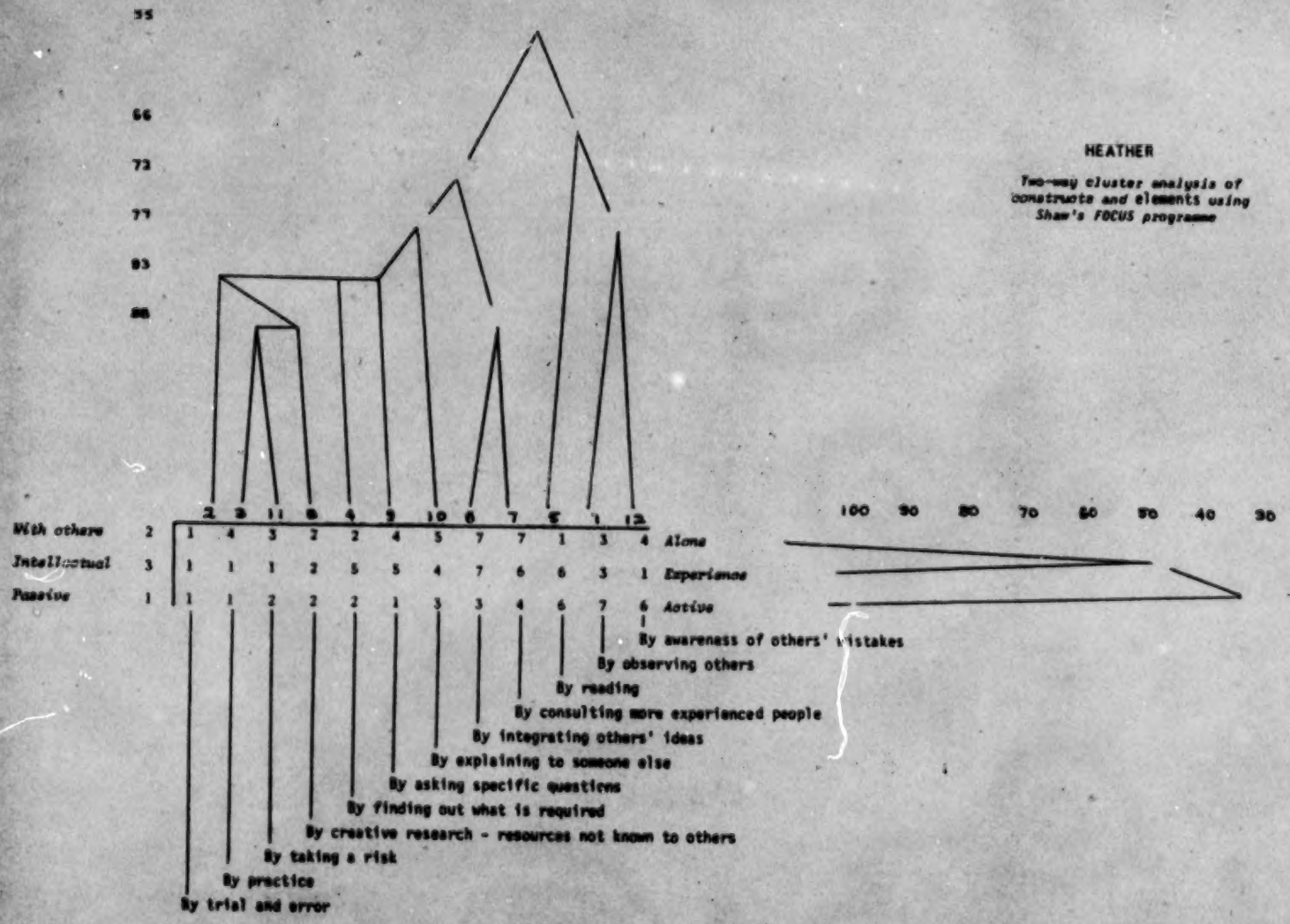
LEARNING-STYLE PROFILE

APPENDIX 4

Two-way cluster analyses of Respondents' Repertory Grids, using Shaw's FOCUS programme.

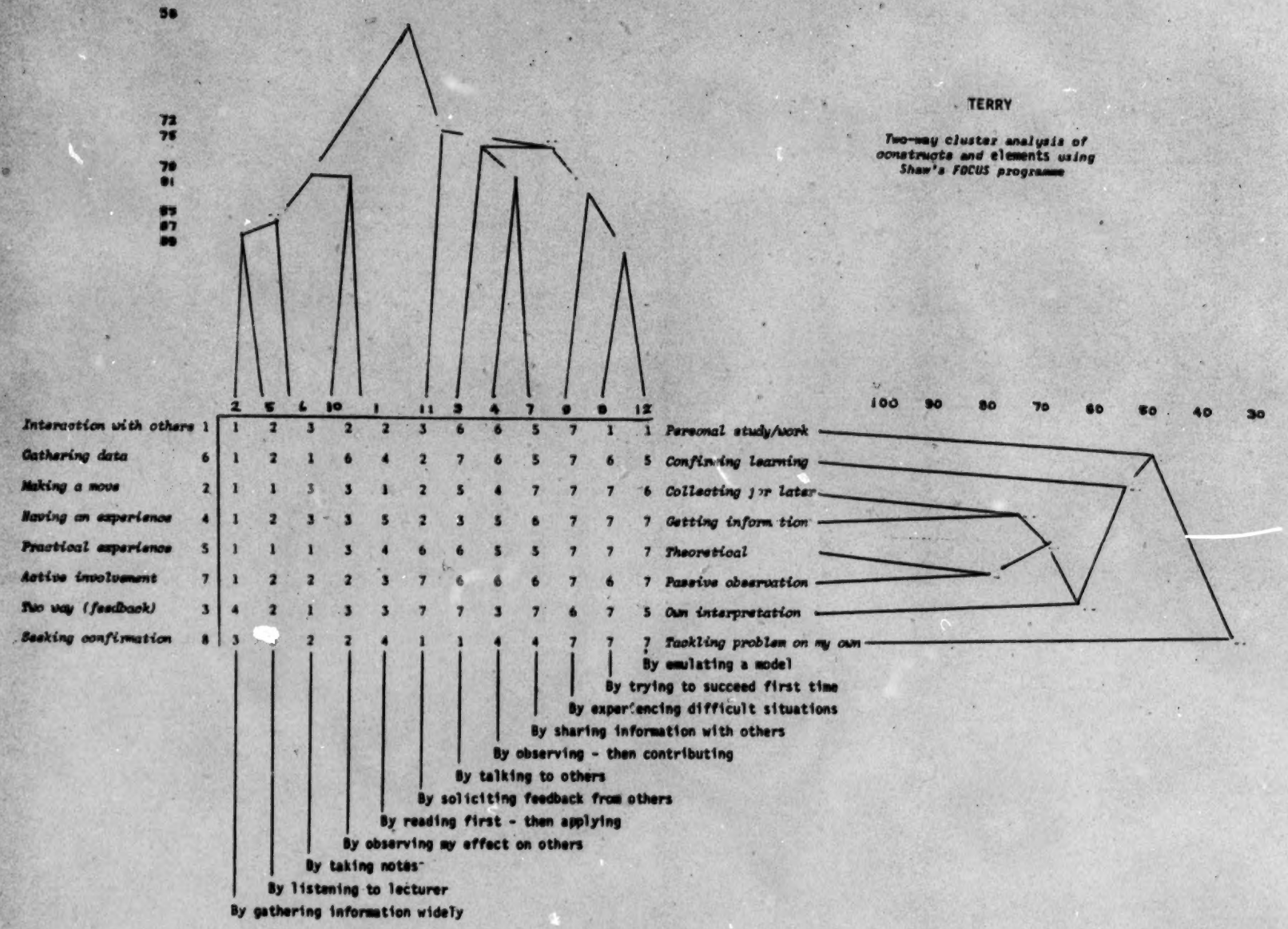
A Kelly Repertory Grid is a two-dimensional table or matrix, showing the rating of each element on each construct. The FOCUS programme re-sorts the rows and columns of the grid, to produce a matrix in which every pair of adjacent rows and columns has more in common than any other arrangement. The programme calculates the percentage degree of 'match' between related pairs, which are then clustered and re-ordered on the basis of the clustering. A tree diagram or dendrogram is printed, showing the clustering of elements, and of constructs.

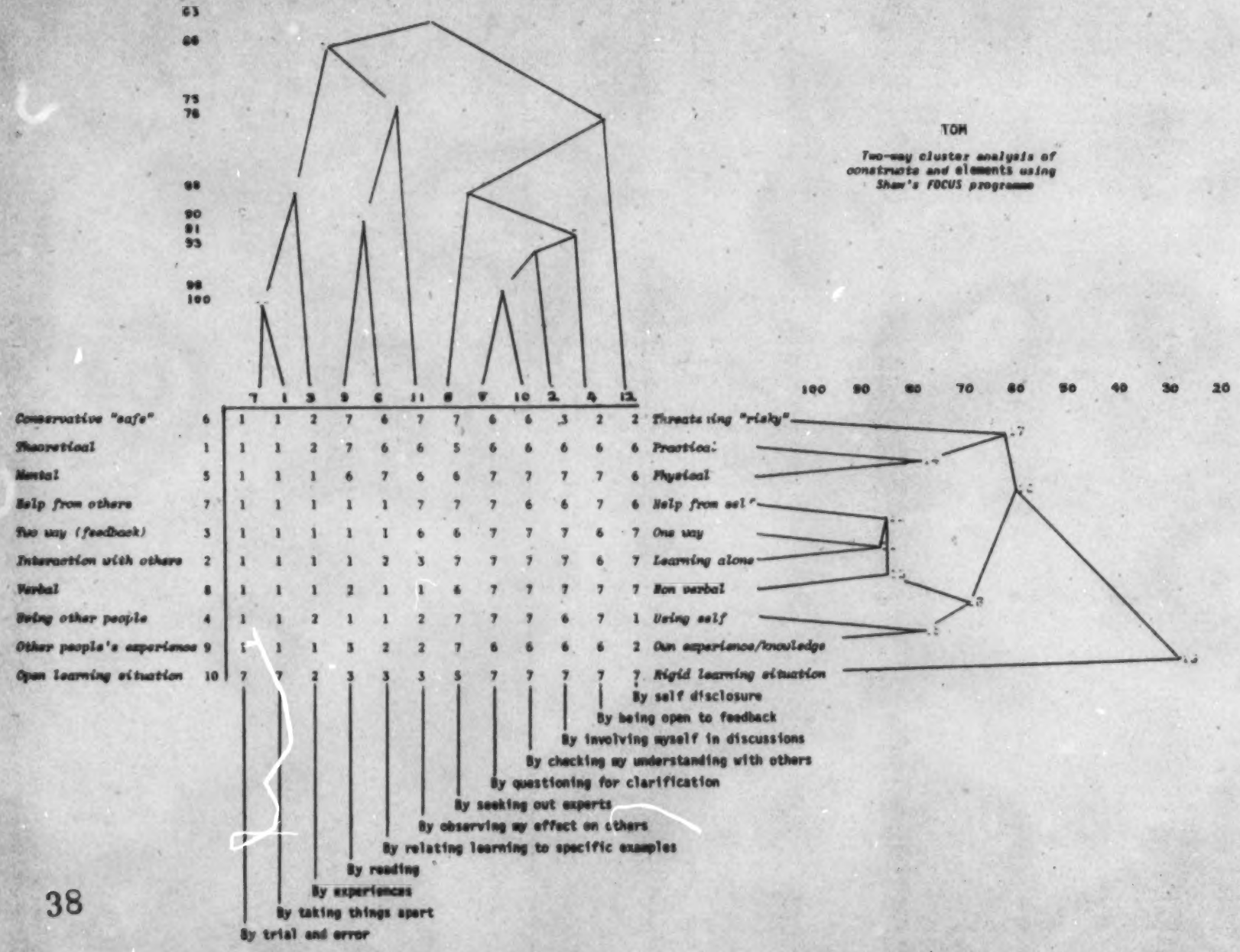

BRUCE
Two-way cluster analysis of constructs and elements using Shaw's FOCUS programme
22
11 10 8 3 1 12 9 2 4 5 7 6
100 90 80 70 60 50 40
Deliberate effort 4 6 7 1 5 5 7 7 5 4 4 6 1 No effort
Involvement 5 5 6 4 6 6 7 7 6 7 7 7 1 Observation/non-involvement
Feedback 11 2 4 6 6 6 7 6 7 7 7 7 2 No feedback
Personal satisfaction 12 7 7 6 5 5 6 7 7 7 6 4 4 Satisfy some one else
Relaxed 7 1 1 4 4 4 6 7 7 6 6 2 4 Disciplined
Experimentation 8 1 1 2 2 6 7 7 3 6 6 4 2 Formal study
Original thinking 10 5 5 4 1 1 6 7 6 7 7 4 1 Some one else's ideas
Information interchange 3 5 5 4 1 1 4 6 7 7 7 7 6 One way information
Hands-on experience first 1 4 4 4 1 1 2 4 7 4 4 4 6 Basic theory first
Airy-fairy/philosophical 6 5 3 2 1 1 2 2 6 6 6 1 6 Practical result
Group 9 1 1 2 1 1 1 2 4 7 7 6 6 Solitary
Several people 2 2 2 4 4 4 4 4 1 7 7 7 6 Only one other point of view
By watching others
By obtaining feedback
By discussion with others
By arguing with others
By discussing with an expert
By trying out new ideas
By trial and error
By practical experience - book as a guide
By input followed by a manual
By failing something I thought I knew
By taking notes
By re-reading own notes

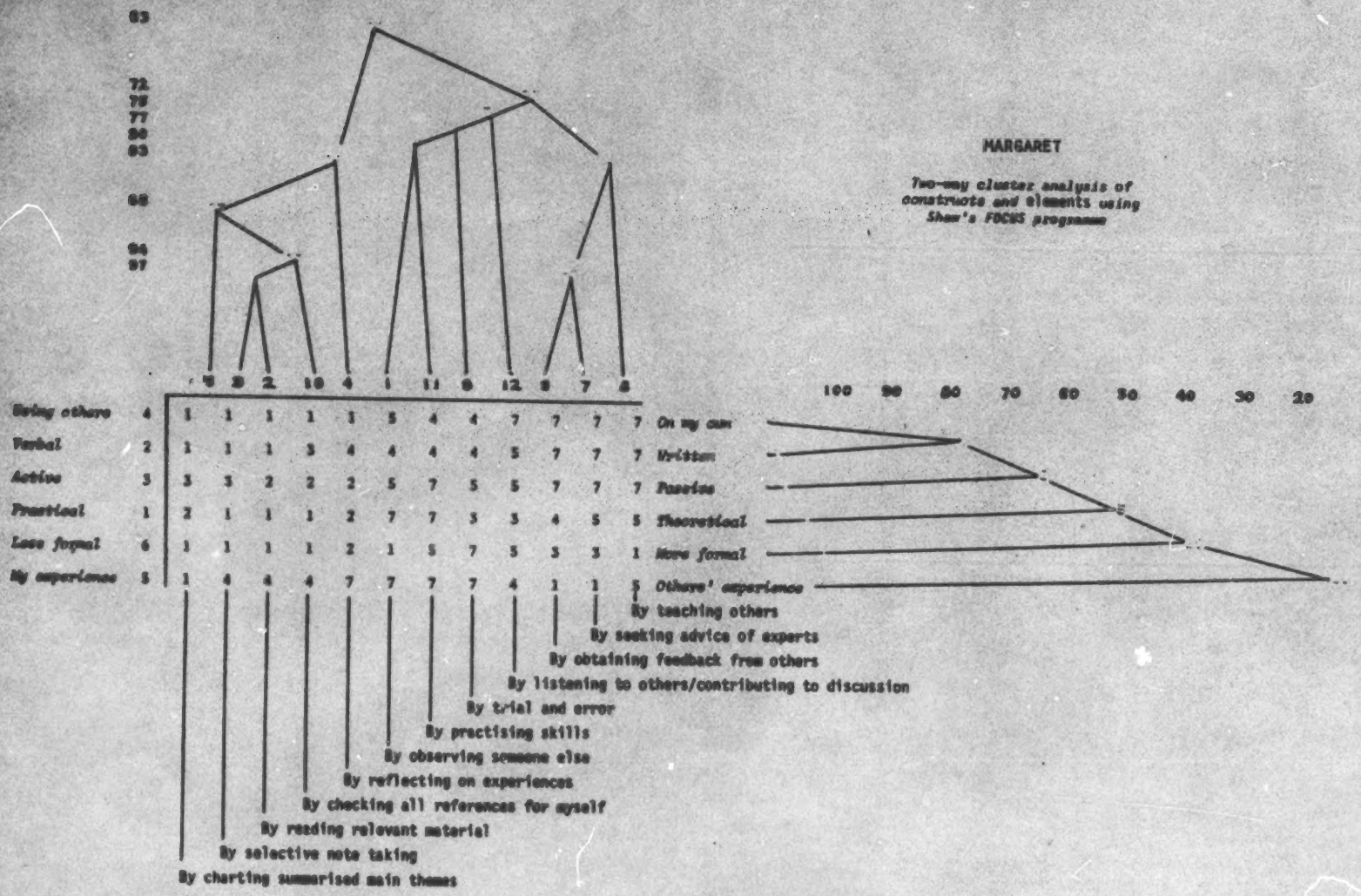

55
66
72
77
83
88
2 3 11 8 4 9 10 6 7 5 1 12
With others 2 1 4 3 2 2 4 5 7 7 1 3 4 Alone
Intellectual 3 1 1 1 2 5 5 4 7 6 6 3 1 Experience
Passive 1 1 1 2 2 2 1 3 3 4 6 7 6 Active
By awareness of others' mistakes
By observing others
By reading
By consulting more experienced people
By integrating others' ideas
By explaining to someone else
By asking specific questions
By finding out what is required
By creative research - resources not known to others
By taking a risk
By practice
By trial and error
100 90 80 70 60 50 40 30

HEATHER

Two-way cluster analysis of constructs and elements using Shaw's FOCUS programme


TERRY
Two-way cluster analysis of constructs and elements using Shaw's FOCUS programme
58
72
76
79
81
87
87
89
2 5 6 10 1 11 3 4 7 9 8 12
100 90 80 70 60 50 40 30
Interaction with others 1 1 2 3 2 2 3 6 6 5 7 1 1
Gathering data 6 1 2 1 6 4 2 7 6 5 7 6 5
Making a move 2 1 1 3 3 1 2 5 4 7 7 7 6
Having an experience 4 1 2 3 3 5 2 3 5 6 7 7 7
Practical experience 5 1 1 1 3 4 6 6 5 5 7 7 7
Active involvement 7 1 2 2 2 3 7 6 6 6 7 6 7
Two way (feedback) 3 4 2 1 3 3 7 7 3 7 6 7 5
Seeking confirmation 8 3 2 2 2 4 1 1 4 4 7 7 7
Personal study/work
Confirming learning
Collecting for later
Getting information
Theoretical
Passive observation
Own interpretation
Tackling problem on my own
By emulating a model
By trying to succeed first time
By experiencing difficult situations
By sharing information with others
By observing - then contributing
By talking to others
By soliciting feedback from others
By reading first - then applying
By observing my effect on others
By taking notes
By listening to lecturer
By gathering information widely


TOM
Two-way cluster analysis of constructs and elements using Shaw's FOCUS programme
63
66
75
78
88
90
91
93
98
100
7 1 3 9 6 11 8 5 10 2 4 12
Conservative "safe" 6 1 1 2 7 6 7 7 6 6 3 2 2 Threatening "risky"
Theoretical 1 1 1 2 7 6 6 5 6 6 6 6 6 Practical
Mental 5 1 1 1 6 7 6 6 7 7 7 7 6 Physical
Help from others 7 1 1 1 1 1 7 7 7 6 6 7 6 Help from self
Two way (feedback) 3 1 1 1 1 1 6 6 7 7 7 6 7 One way
Interaction with others 2 1 1 1 1 2 3 7 7 7 7 6 7 Learning alone
Verbal 8 1 1 1 2 1 1 6 7 7 7 7 7 Non verbal
Being other people 4 1 1 2 1 1 2 7 7 7 6 7 1 Using self
Other people's experience 9 1 1 1 3 2 2 7 6 6 6 6 2 Own experience/knowledge
Open learning situation 10 7 7 2 3 3 3 5 7 7 7 7 7 Rigid learning situation
By self disclosure
By being open to feedback
By involving myself in discussions
By checking my understanding with others
By questioning for clarification
By seeking out experts
By observing my effect on others
By relating learning to specific examples
By reading
By experiences
By taking things apart
By trial and error
100 90 80 70 60 50 40 30 20


MARGARET
Two-way cluster analysis of constructs and elements using Shaw's FOCUS programme
100 90 80 70 60 50 40 30 20
On my own
Written
Passive
Theoretical
More formal
Others' experience
By teaching others
By seeking advice of experts
By obtaining feedback from others
By listening to others/contributing to discussion
By trial and error
By practising skills
By observing someone else
By reflecting on experiences
By checking all references for myself
By reading relevant material
By selective note taking
By charting summarised main themes
Being others
Verbal
Active
Practical
Less formal
My experience

APPENDIX 5

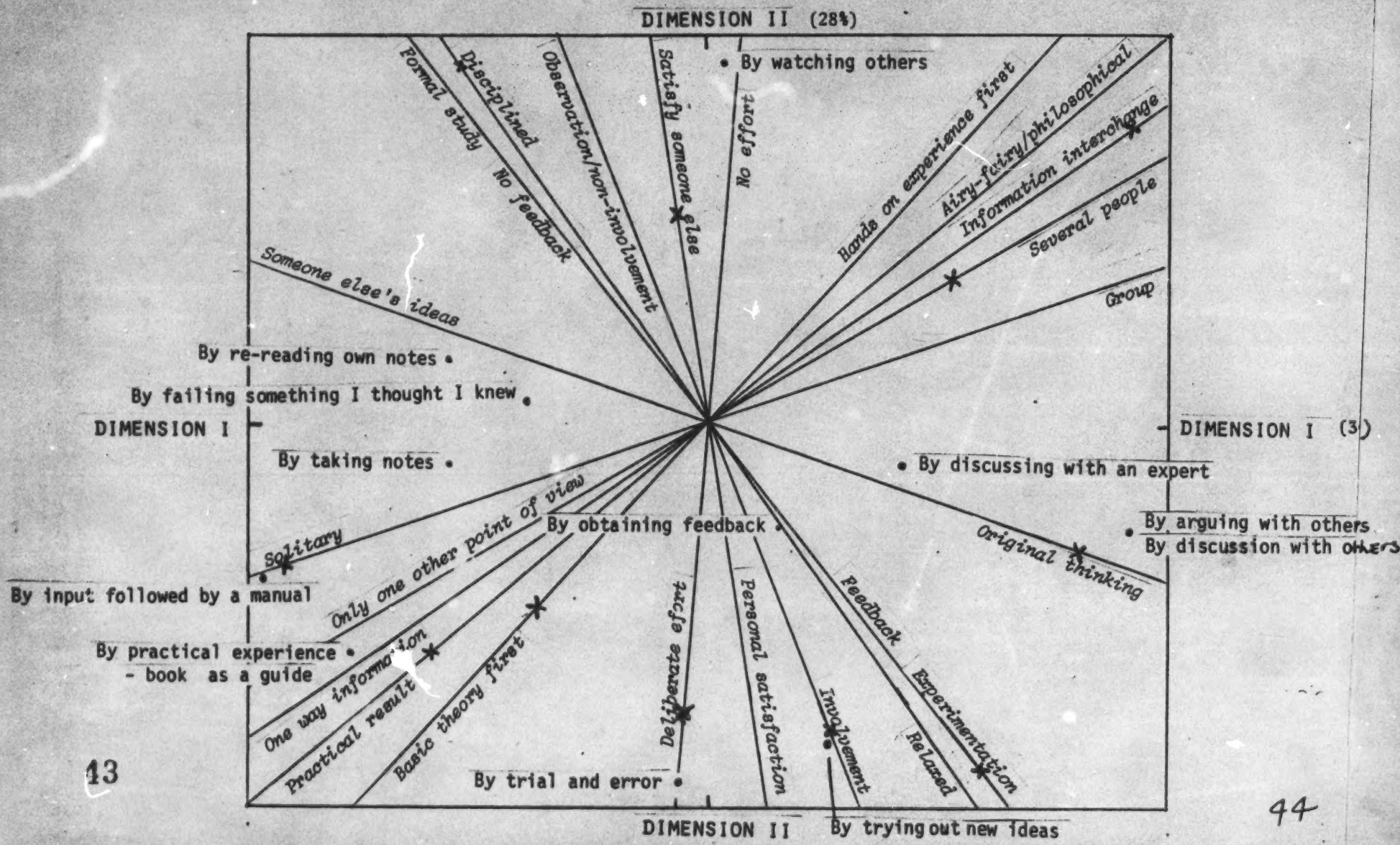
Principal Components Analyses of Respondents' Repertory Grids, using Slater's INGRID programme.

The INGRID (or Individual Grid) Programme, carries out a Principal Components Analysis which delineates significant orthogonal structure, both of constructs in relation to elements, and of elements in relation to constructs.

The results of this analysis are plotted using the INGPLT Programme, written by Dr Peter Salmon of the Melbourne University Agricultural Extension Research Unit. In the diagrams which follow, the first Principal Component is the Horizontal dimension, and the second Principal Component is the vertical. The percentage of the total variance in the grid explained by each principal component appears in brackets. The two dimensions are independent.

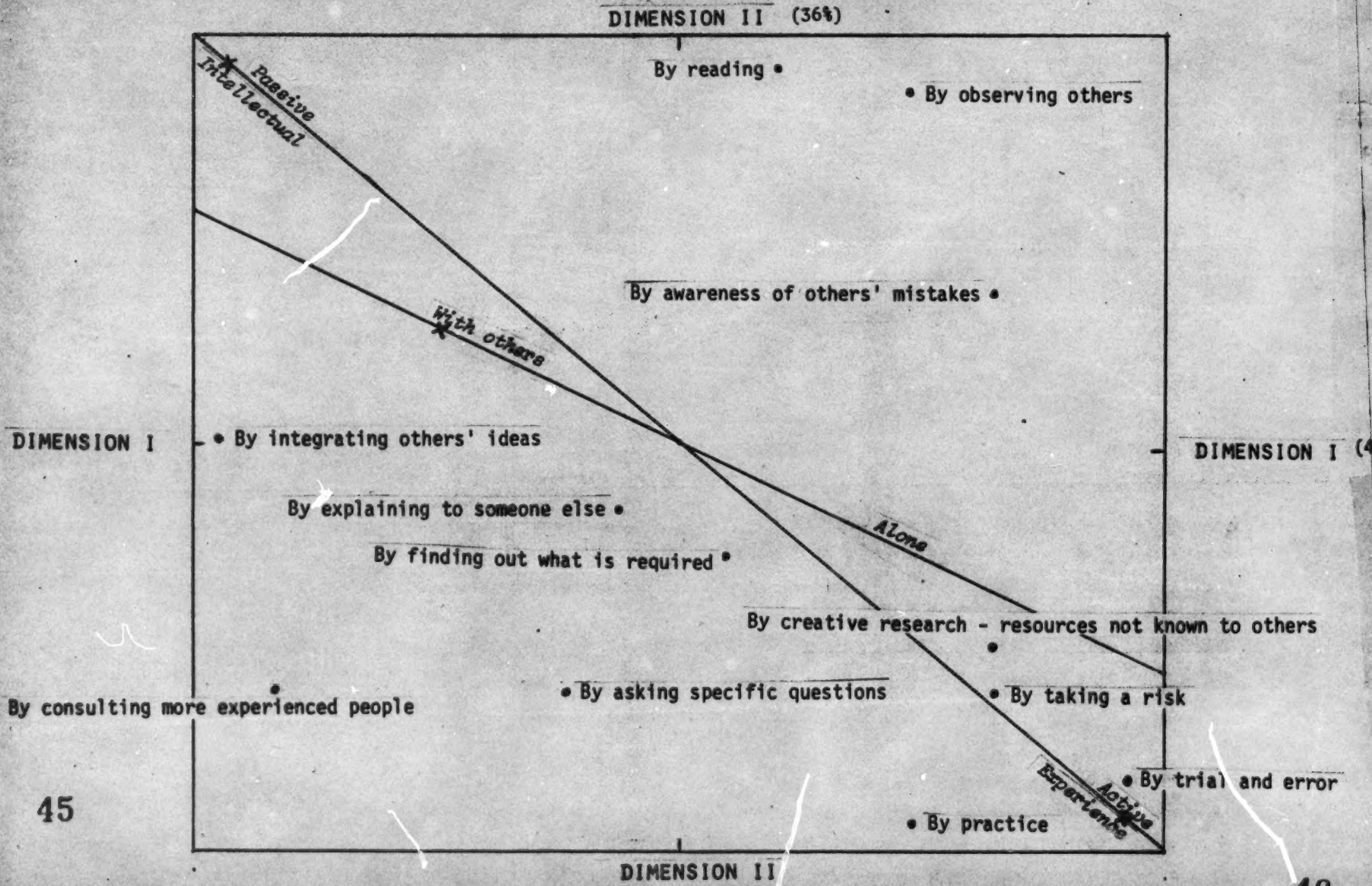
The Principal Components are most heavily influenced by the *constructs* which are nearest to them, and by those which are further from the centre of the diagram. Crosses (X) have been placed on the *construct lines* to indicate their relative weighting. These diagrams give a valuable synoptic view of the individual's construct system.

Constructs and elements plotted along the two major dimensions from a principal components analysis using Slater's INGRID programme

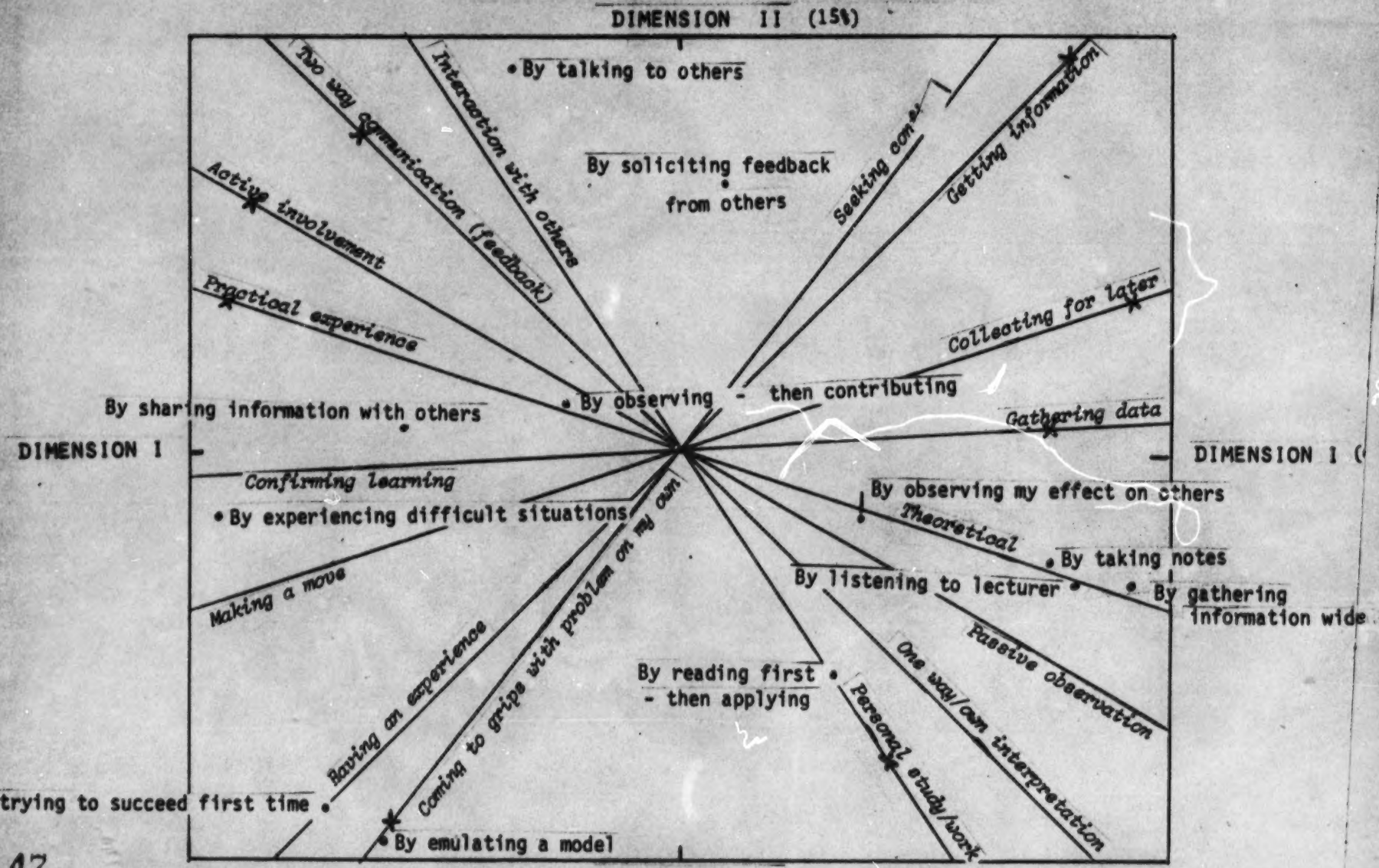


HEATHER

Constructs and elements plotted along the two major dimensions from a principal components analysis using Slater's INGRID programme

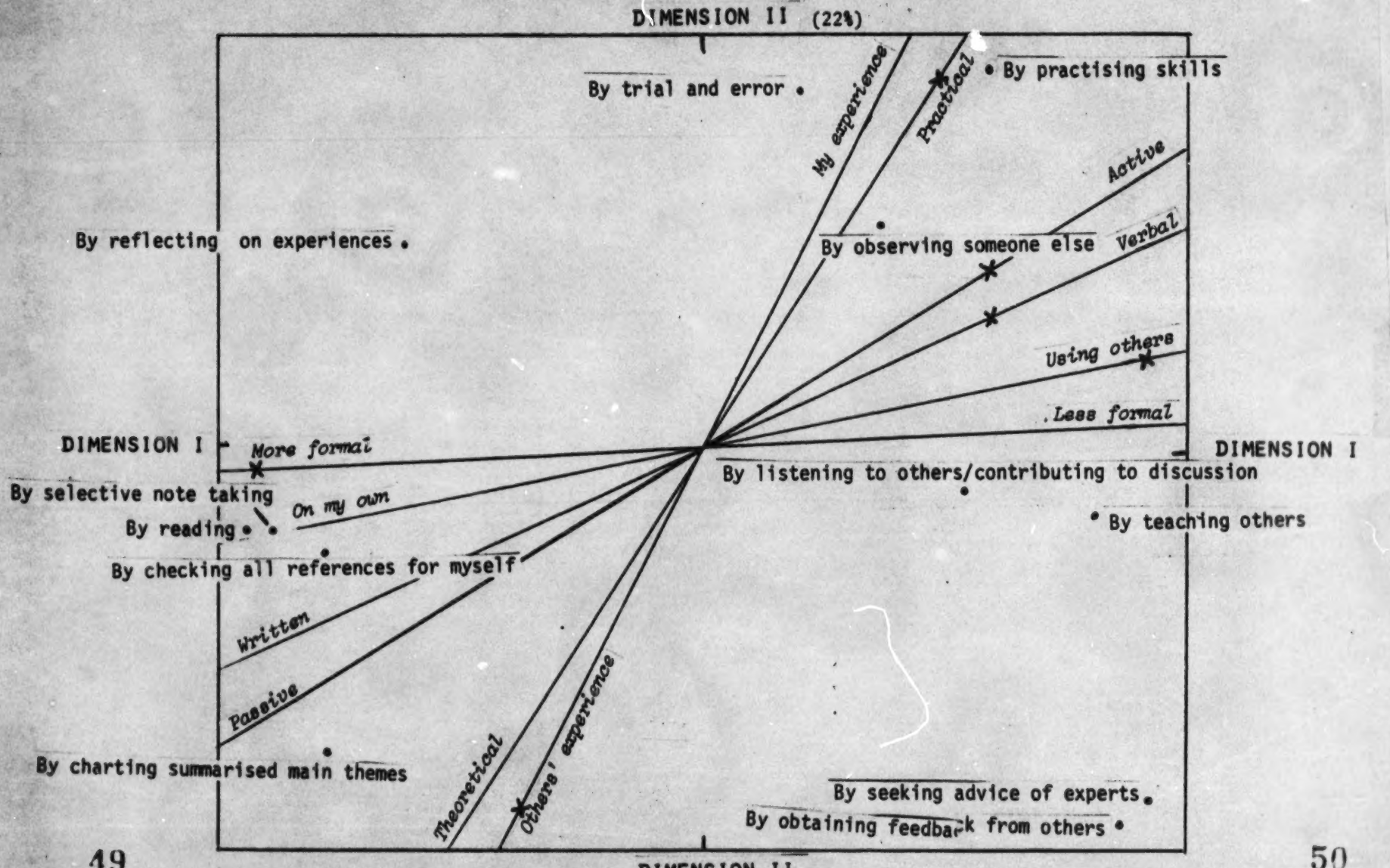


Constructs and elements plotted along the two major dimensions from a principal components analysis using Slater's INGRID programme



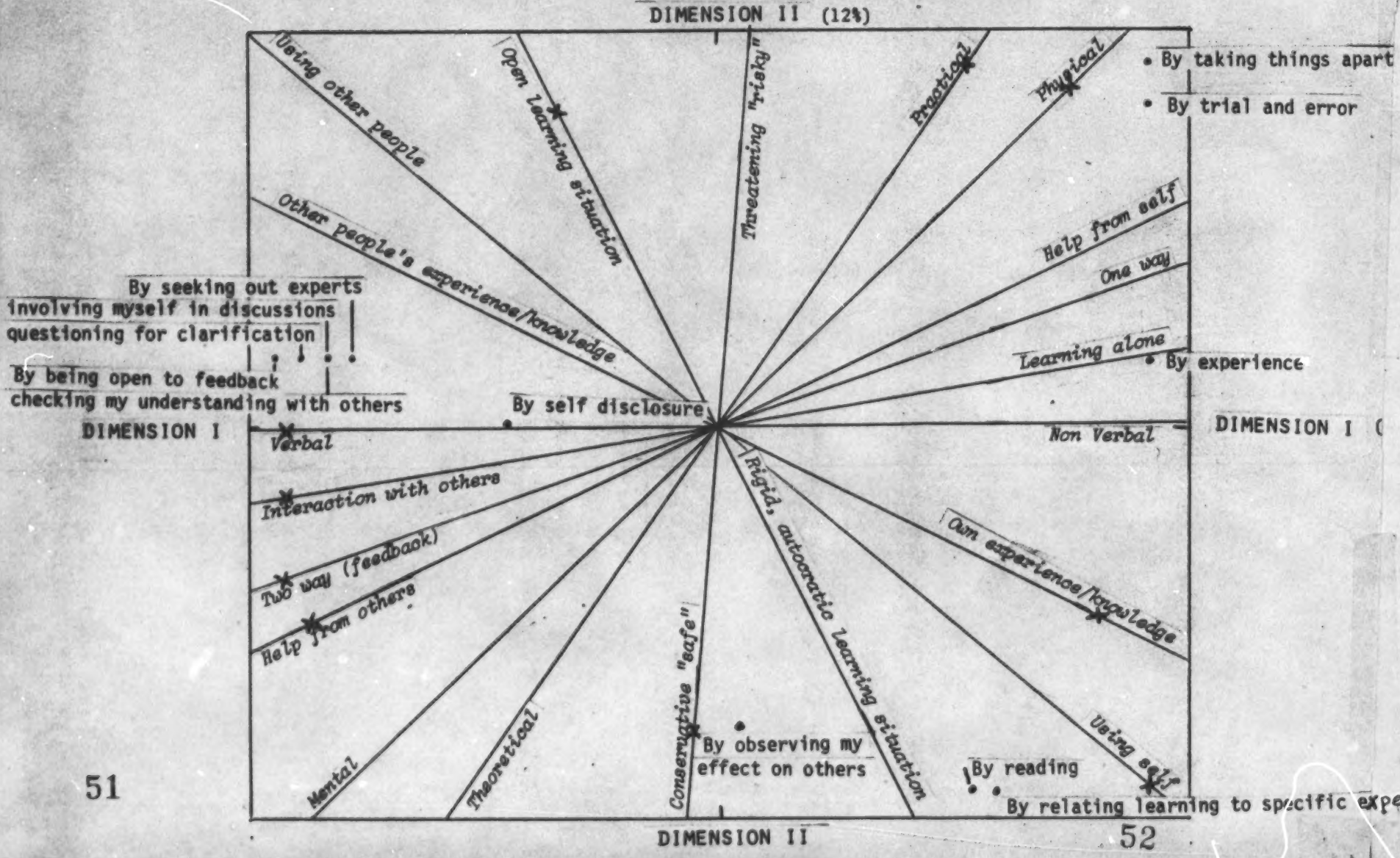
MARGARET

Constructs and elements plotted along the two major dimensions from a principal components analysis using Slater's INGRID programme



TOM

Constructs and elements plotted along the two major dimensions from a principal components analysis using Slater's INGRID programme



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